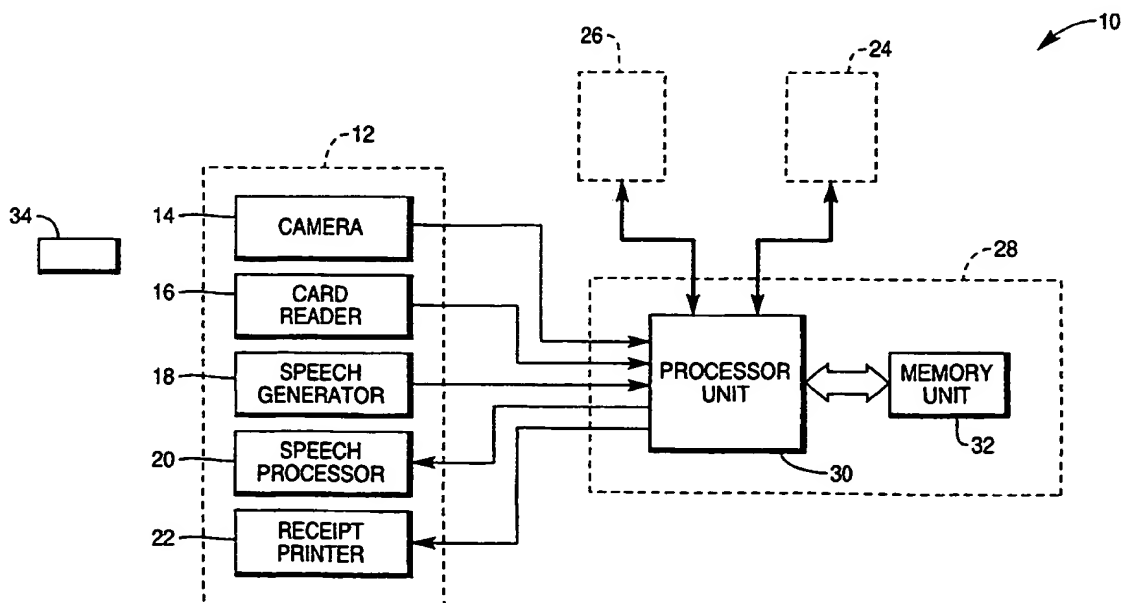




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : G07F 7/10	A1	(11) International Publication Number: WO 00/28492 (43) International Publication Date: 18 May 2000 (18.05.00)
(21) International Application Number: PCT/GB99/03684 (22) International Filing Date: 8 November 1999 (08.11.99) (30) Priority Data: 9824697.8 11 November 1998 (11.11.98) GB (71) Applicant (for all designated States except US): NCR INTERNATIONAL, INC. [US/US]; 1700 South Patterson Boulevard, Dayton, OH 45479 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): NICOLL, Kenneth, Andrew [GB/GB]; Parkview, 174 Coupar Angus Road, Birkhill, Dundee DD2 5PG (GB). PATON, Grant, Charles [GB/GB]; 26 Strips of Craigie Road, Dundee DD4 7QG (GB). ROSSMANN, Wolf, Dieter [DE/GB]; Burnbrae Cottage, Bridgend of Lintrathen, Angus DD8 5JH (GB). LEONG, Liem, Hak [GB/GB]; 50 Elie Avenue, Broughty Ferry, Dundee DD5 3SF (GB). McNAMARA, Michael, Robertson [GB/GB]; 39 Marlborough Street, Portobello, Edinburgh EH15 2BD (GB). (74) Agent: WILLIAMSON, Brian; NCR Limited, International Patent Department, 206 Marylebone Road, London NW1 6LY (GB).		(81) Designated States: BR, CN, JP, US, ZA, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: TERMINAL WITH BIOMETRIC IDENTITY CHECK



(57) Abstract

A self-service terminal (10) comprises a non-contact interface (18, 20) for enabling a user to interact with the terminal without requiring physical contact with the terminal, a biometric sensor (14) for establishing the identity of the user by sensing a physical trait or characteristic of the user, and a processor (30) for controlling the terminal. The interface (18, 20) may utilise speech recognition and generation.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

TERMINAL WITH BIOMETRIC IDENTITY CHECK

This invention relates to a terminal, such as a self-service terminal (SST), and typically an automated teller machine (ATM). Aspects of the invention also relate to a terminal for carrying out non-cash transactions, such as in outlets where customers purchase goods or services using credit or debit cards.

A conventional self-service terminal (SST), such as an automated teller machine (ATM), includes a card reader device to initiate a transaction, a keypad to input information and instructions to the terminal and a display to output instructions and information to the user. These devices are expensive and require a level of assumed knowledge and effort from the user.

In addition, these devices must be located conveniently for users of the terminal. In practice, a terminal will typically be set out in a compromise configuration; of course such a configuration may involve some difficulty for users who are shorter or taller than average, and will likely prove difficult if not impossible to access by wheelchair users. A somewhat similar

difficulty arises in "drive-up" applications, where it is intended that the user may complete a transaction or operation using the terminal without leaving their vehicle.

In this application, the terminal must attempt to accommodate variations in vehicle configuration as well as physical differences in users.

It is among the objectives of aspects of the present invention to provide a self-service terminal which obviates or mitigates these difficulties.

According to a first aspect of the present invention there is provided a self-service terminal comprising:

non-contact interface means for enabling a user to interact with the terminal without requiring physical contact with the terminal;

biometric sensing means for establishing the identity of the user by sensing a physical trait or characteristic of the user; and

processor means for controlling the terminal.

According to a second aspect of the present invention there is provided a method of operating a self-service terminal, the method comprising:

enabling a user to interact with the terminal without requiring physical contact with the terminal; and

establishing the identity of the user by sensing a physical trait or characteristic of the user.

The provision of non-contact interface means in combination with biometric sensing means allows a user to interact with a terminal while requiring little or no physical contact or interaction with the terminal. This offers a number of significant advantages over existing terminals. For example, where the terminal is an ATM, it may be possible to dispense with a number of features found in conventional ATMs, such as the card reader device and input slot, the keypad to input information and the display. Accordingly, it may be possible to provide an ATM in accordance with the invention at significantly lower cost. Further, as there may be little or no need to interact with the terminal physically, a terminal may be made more easily accessible to users of a wide variety of statures and wheelchair users. Similarly, in "drive-through" applications, a terminal may be more easily accessed by users in a variety of vehicles. In preferred embodiments of the present invention in the form of ATMs, the only physical contact the user has with the terminal may be to withdraw banknotes from an appropriate cash dispenser slot.

The non-contact interface means may include one or both of means for outputting terminal instructions for the user in natural speech and means for inputting spoken user instructions for the terminal. Thus, the terminal and user may "converse".

The biometric sensing means may take any suitable form, preferably utilising a non-contact technique such as iris pattern recognition, but said means may use other biometric patterns including facial geometry, fingerprints, palmprints, voice patterns, finger geometry or other physical traits or characteristics, or a combination of one or more of these.

Preferably, the biometric sensing means identifies the user, such that an operator may utilise the terminal without having to present a identification card or the like. Alternatively, said means may be used to verify the identity of a user, where the user has "claimed" an identity by presenting a means for identifying themselves, such as an identification card or the like, to the terminal. In such an embodiment it is preferred that the identifying means does not require physical contact with the terminal, such as an identification card that may be read by the terminal using a camera or the like, or is

capable of remote interrogation or communication with the terminal.

In order to establish the identity of a user by one or more biometric identifiers, it is of course first necessary to create a record of the user's biometric identifiers, which allows comparison between a biometric identifier sensed by the terminal and the stored information. When a best match is made, the user is offered the services available from the terminal. The information may be stored on a "smart" card carried by the user, or may be stored in a central database.

According to another aspect of the present invention there is provided a non-cash transaction terminal comprising:

interface means for enabling entry of transaction details;

biometric sensing means for identifying a user by sensing a physical trait or characteristic of the user; and

processor means for controlling the terminal.

According to a further aspect of the present invention there is provided a method of carrying out a non-cash transaction, the method comprising:

providing a terminal;

entering transaction details in the terminal; and
identifying a user by sensing a physical trait or
characteristic of the user; and
processing the transaction.

These aspects of the invention have application in retail stores and the like where users or customers wish to purchase goods or services. As the customer is identified by the terminal, there is no requirement for the customer to present a credit or debit card. Clearly this is more convenient for the customer and minimises the possibility of fraud; a thief cannot obtain or "steal" an individual's biometric identifiers, whether this is an iris pattern or other identifier.

These and other aspects of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a self-service terminal (SST), in the form of an automated teller machine (ATM), in accordance with an embodiment of one aspect of the present invention; and

Figure 2 is a block diagram of a non-cash transaction terminal in accordance with an embodiment of another aspect of the present invention.

Reference is first made to Figure 1 of the drawings which is a block diagram representation of a self-service terminal, in the form of an ATM 10, in accordance with an embodiment of a first aspect of the present invention.

The ATM 10 has a user interface 12, incorporating a number of features and facilities, illustrated as individual modules. In the illustrated embodiment, these features include a camera 14, a non-contact card reader 16, a loudspeaker and speech generator 18, a microphone and speech processor 20 and a receipt printer 22, which is associated with a receipt printer slot (not shown) provided in the face of the machine.

Figure 1 also shows a cash dispenser module 24 which is associated with a cash dispenser slot in the face of the machine, and a biometrics sensing processor unit 26 which operates in association with the camera 14, as will be described.

The ATM 10 further comprises processor means in the form of a controller unit 28 which communicates with components of the interface module block 12, with the cash dispenser module 24, and with the biometrics sensing processor unit 26. In a typical ATM, the controlling unit 28 will also communicate with an operator panel (not

shown).

The controller unit 28 includes a processor unit 30 and a non-volatile memory 32 implemented by a micro-computer having non-volatile RAM.

The ATM 10 is used in conjunction with smart cards 34 which contain details of the user's selected biometric identifier.

In use, the user approaches the terminal 10 and places or holds the card 34 adjacent the terminal 10 such that the card reader 16 may read the customer details from the card 34 and initiate a transaction. Once the user has been identified, the camera 14 records an image of the iris pattern of the user and the image is conveyed, via the processor unit 30, to the biometrics sensing unit 26 where the iris pattern data read from the card 34, in the form of an enrolment template, is compared with the data received from the camera 14. Typically, the information stored on the card 34 will be in the form of an iris code, representing a processed image of the user's iris. The biometric sensing unit 26 processes the image received from the camera 14 to create a current iris code, or current template which is compared with the enrolment template stored on the card 34, to verify the identity of the user.

Typically, the enrolment template, in the form of a sequence of binary digits, is compared with the current template, also a sequence of binary digits, on a bit-by-bit basis using an exclusive OR function. To improve the speed of the comparison, all of the bit comparisons are performed simultaneously. The two templates match if they differ by less than a predetermined number of bits.

If the identity of the user is verified by the biometrics sensing unit 26, then the user is allowed to access the facilities provided by the ATM 10 and a menu of the various transactions available to the user may be relayed to the user, in natural speech, via the speech generator and loudspeaker 18. User responses are made via the microphone and speech processor 20.

It will be apparent to those of skill in the art that the ATM 10 allows users to interact with the ATM 10 with little or no physical contact with the ATM 10, a user only having to make their smart card 34 visible to the card reader 16, converse with the terminal 10 via the speech generator and loudspeaker 18 and the microphone and speech processor 20, and then retrieve any banknotes or receipts issued by the cash dispenser module 24 or receipt printer 22. Accordingly, the ATM 10 is easily accessible to a wide

range of users. Further, the absence of a requirement to provide, for example, a display and keypad, allow greater flexibility in the configuration of user interfaces, and also minimises the expense associated with the provision of such interfaces.

In other embodiments of this aspect of the present invention a self-service terminal may include a display or other features of a convention ATM user interface panel.

In still further embodiments of this aspect of the present invention, the card reader 16 may be omitted, user identification being achieved solely by iris pattern recognition, or some other biometric sensing technique. For added security, and to accommodate imperfect biometric sensing, a plurality of biometric identifiers may be employed.

Reference is now made to Figure 2 of the drawings, which is a block diagram of a non-cash transaction terminal 110 in accordance with an embodiment of another aspect of the present invention. The terminal 110 is of the type commonly found in retail outlets, to allow a customer to purchase goods or services using a credit card or debit card.

The terminal 110 shares a number of functional

features with the ATM 10 described above, and common functional elements are designated in Figure 2 with the same numerals as the ATM illustrated in Figure 1, prefixed by a "1".

In the illustrated embodiment, the terminal 110 is intended to operate without the use of a smart card, and utilises a camera 114 which operates in conjunction with a biometric sensing processor unit 126 to identify the user.

The terminal 110 is also provided with a keypad 118 to allow a sales assistant or the like to enter details of a transaction, for example the purchase price of an item. A display 140 is provided to allow verification of the information entered via the keypad 142, and may be used to display other messages and information as desired. To provide a hard copy record of a transaction, the terminal 110 also incorporates a receipt printer 122.

Whereas the iris code of the first embodiment described above was stored on a smart card 34, in this embodiment the iris code is stored in a remote database 134, the terminal processor unit 130 communicating with the database 134 as required.

In use, a user will register with a financial institution and an image of the iris pattern of one eye of

the user is recorded and translated to the appropriate iris code and entered in the database 134.

If the user is a customer in a retail outlet and wishes to purchase some goods, a sales assistant directs the customer action to allow the biometrics examination to take place, for example by asking the customer to look towards the camera 114. If the customer has a number of accounts or payment options, the customer will also be asked to select the method of payment, which information may be entered via the keypad. The biometric sensing unit 126 then examines the iris pattern recorded by the camera 114, and then forwards the encoded biometrics details to the remote database 134 for identification. Once the customer has been identified the transaction is carried out in a secure manner.

It will be apparent to those of skill in the art that this embodiment offers the significant advantage that the customer need not carry or present a credit card or debit card, and thus the possibility of fraud is substantially reduced.

In other embodiments of this aspect of the present invention, a smart card, similar to the smart card 34 described above, could be utilised, rather than relying

upon access to a remote database 134.

CLAIMS

1. A self-service terminal comprising:

non-contact interface means for enabling a user to interact with the terminal without requiring physical contact with the terminal;

biometric sensing means for establishing the identity of the user by sensing a physical trait or characteristic of the user; and

processor means for controlling the terminal.

2. The terminal of claim 1, wherein the interface means includes means for outputting terminal instructions for the user in natural speech.

3. The terminal of claim 1 or 2, wherein the interface means includes means for inputting spoken user instructions for the terminal.

4. The terminal of claim 1, 2 or 3, wherein the biometric sensing means utilises non-contact sensing.

5. A method of operating a self-service terminal, the method comprising:

enabling a user to interact with the terminal without requiring physical contact with the terminal; and

establishing the identity of the user by sensing a physical trait or characteristic of the user.

6. The method of claim 5, further comprising the steps:

outputting terminal instructions for the user in natural speech; and

permitting inputting of spoken user instructions for the terminal.

7. The method of claim 5 or 6, wherein the identity of the user is establish by a non-contact technique.

8. The method of claim 5, 6 or 7, further comprising the step of:

creating a record of a user's biometric identifier; and

comparing a biometric identifier sensed by the terminal with the record identifier.

9. A non-cash transaction terminal comprising:

interface means for enabling entry of transaction details;

biometric sensing means for identifying a user by sensing a physical trait or characteristic of the user; and

processor means for controlling the terminal.

10. A method of carrying out a non-cash transaction, the method comprising:

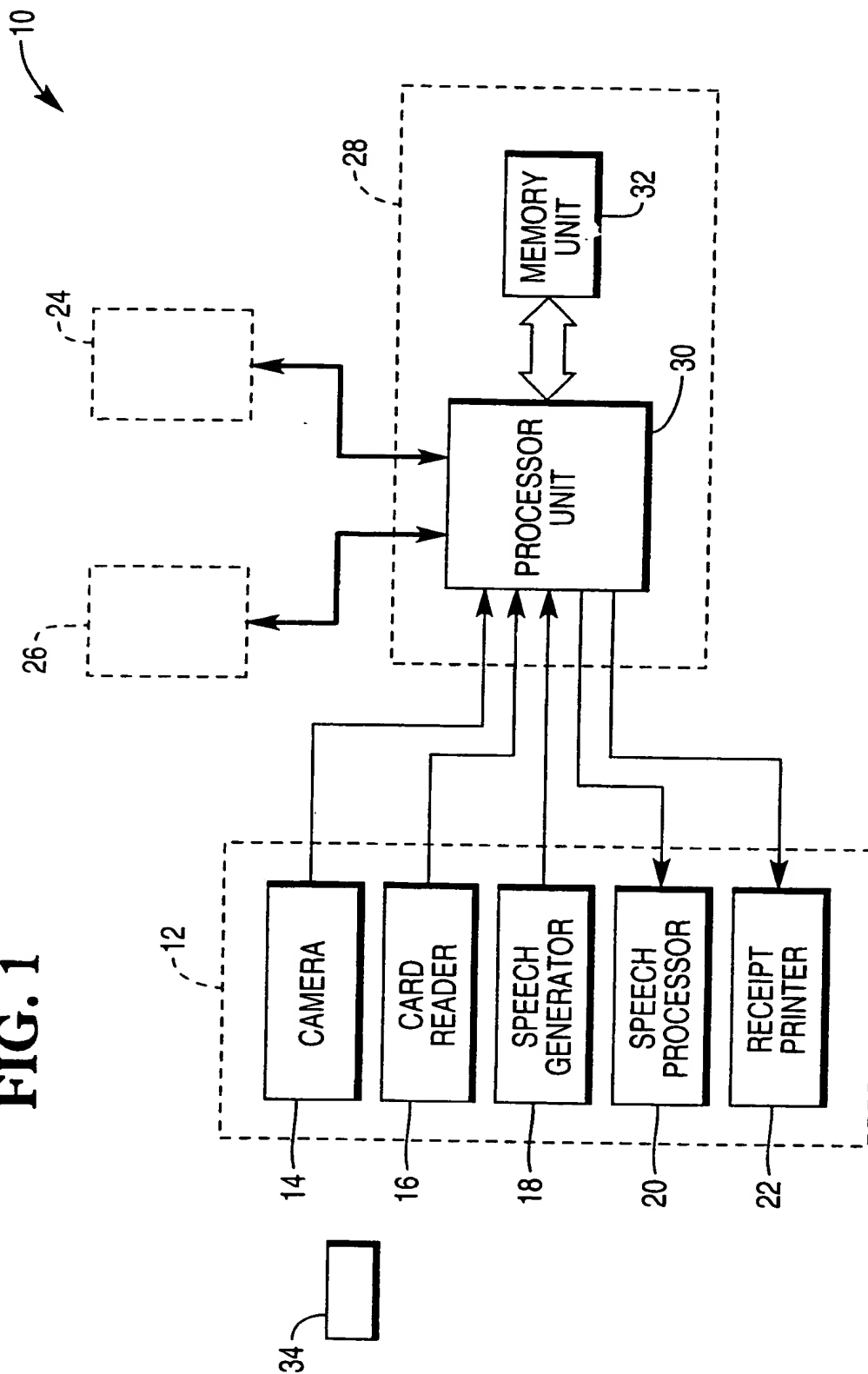
providing a terminal;

entering transaction details in the terminal; and

identifying a user by sensing a physical trait or characteristic of the user; and

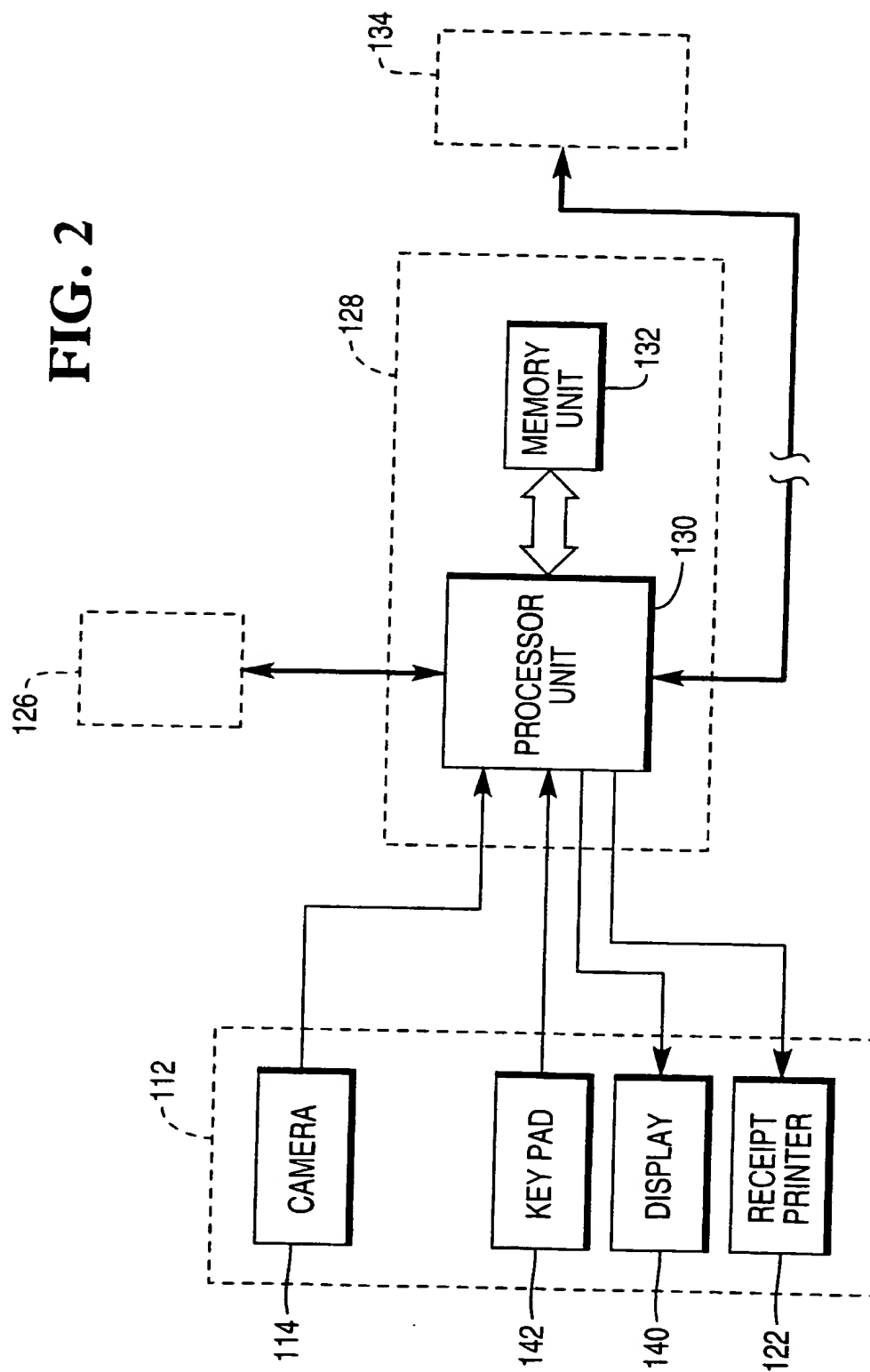
processing the transaction.

FIG. 1



2/2

FIG. 2



INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03684

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G07F7/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G07F G07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 386 104 A (SIME IAIN R F) 31 January 1995 (1995-01-31) column 1, line 55 - column 2, line 11 column 4, line 19 - line 41; figures 2,3	1,4,5, 7-10
A	GB 2 119 992 A (TOKYO SHIBAURA ELECTRIC CO) 23 November 1983 (1983-11-23) page 1, line 49 - line 75 page 8, line 48 - line 98 page 10, line 94 - page 11, line 31; figures 16-18	2,6
X	EP 0 504 616 A (ASCOM AUTELCA AG) 23 September 1992 (1992-09-23) the whole document	1,4,5, 7-10
-/-		

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

11 February 2000

Date of mailing of the international search report

22/02/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Guivol, 0

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 99/03684

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 196 36 677 A (JAVANBAKHSN HASAN) 30 April 1998 (1998-04-30) the whole document	1,4,5, 7-10
A	EP 0 860 772 A (SENSHU BANK LTD) 26 August 1998 (1998-08-26) the whole document	3,6,10
A	WO 89 08899 A (DATACARD CORP) 21 September 1989 (1989-09-21) page 4, line 1 - line 13 page 6, line 20 -page 7, line 9 page 9, line 24 -page 10, line 30	1,4,5, 7-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/03684

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5386104	A	31-01-1995	EP 0652540 A	10-05-1995
			JP 7192164 A	28-07-1995
GB 2119992	A	23-11-1983	JP 58192166 A	09-11-1983
			JP 58192171 A	09-11-1983
			HK 14288 A	04-03-1988
			US 4593183 A	03-06-1986
EP 0504616	A	23-09-1992	NONE	
DE 19636677	A	30-04-1998	DE 29623437 U	06-08-1998
EP 0860772	A	26-08-1998	JP 10105368 A	24-04-1998
			AU 3459197 A	09-02-1998
			CA 2231585 A	22-01-1998
			WO 9802795 A	22-01-1998
WO 8908899	A	21-09-1989	NONE	